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Research and Technology Needs

Focus on:
Force Protection
Combating Terrorism
Surveillance Technology

"Countering the Terrorist Kill Chain"

Mr. Benjamin Riley

ADUSD (Force Protection)

Chairman,

Combating Terrorism Technology Task Force (CTTTF)

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Overview

- **Key Themes & Activities to Date**
- **Relearning Counterinsurgency Warfare & Future Insurgency Threats**
- **Critical Capabilities & Research Areas**

Key Themes

- **Criticality of addressing IED threat as a component of Counter Insurgency/Counter Terrorism (CI/CT) operations**
  - Recognize the challenges of CI/CT operations
  - Develop means to respond to rapidly developing and changing threats
  - Need to address as an end to end, systems approach
  - Examine systems capabilities within a larger context/architecture
  - Identify, develop and field required capabilities
- **Focus on "teaming of organizations" to leverage, evaluate and exploit technologies across DoD, other government and non-government organizations**
- **Challenge is to quickly identify and field technologies demonstrating value to production level capability in significant numbers. This requires:**
  - Coordination with S&T, acquisition and operational organizations
  - Flexibility in funding, both S&T and procurement, in order to address new, changing threats
  - Constant interchange and dialogue between all relevant communities
  - Throughout the entire process, coordination with production/manufacturing organizations is paramount

Relearning Counterinsurgency Warfare

Office of the Secretary of Defense

- **Modern Warfare: A French View of Counterinsurgency. Roger Trinquier, 1961**
- **A systematic approach is needed**
  - An interlocking system of actions including: political, economic, psychological, military
  - Pitting a traditional combined armed force against insurgents "reminds one of a pile driver attempting to crush a fly."
- **Rather than target the enemy's (insurgents') forces, its organization must be targeted. Elements of insurgency**
  - Cell networks that maintain secrecy
  - Terror used to foster insecurity among the population and drive them to the movement for protection
  - Multifaceted attempts to cultivate population support
  - Attacks against the existing government
  - Only by identifying and destroying the infrastructure of the subversive organization can the government persevere
- **The counterinsurgent must recognize: The guerilla's total dependence upon terrain and population is their weakest point. Therefore:**
  - Separate the guerilla from the population that provides support
  - Occupy zones that the guerilla previously operated from making the dangerous to their survival
  - Turn the population against the guerillas
  - Coordinate actions over a wide area and for a long time
- **The above requires an extremely capable intelligence infrastructure**
  - It requires human sources and deep cultural knowledge of the area

    Intelligence is key

Relearning Counterinsurgency Warfare (Continued)

- **Counterinsurgency Warfare: Theory and Practice. David Galula, 1964**
- **Without a cause, insurgents cannot persuade the population to join or assist their campaign**
  - One cannot understand the theory and practice of counterinsurgency warfare without understanding the socio-political-economic intricacies of the "cause" the insurgents use to mobilize support.
  - Without a cause the insurgents cannot persuade the population to join or assist in the campaign
- **Causes are not static, they change as the insurgency adapts**
- **Counterinsurgents must continuously reassess the nature, scope and degree of the problems around the country**
- **Insurgents will take a strategic pause to adapt, regroup and develop new strategies. Too often a new regime will interpret this as a victory and refocus resources.**
- **A confluence of military and nonmilitary operations defeats the insurgents. This requires an organization vested with power to coordinate political, economic and military actions**

Relearning Counterinsurgency Warfare (Continued)

- **Low Intensity Operations: Subversion, Insurgency and Peacekeeping. Frank Kitson, 1971.**
- **Counterinsurgency combat is "likely to be employing a combination of political, economic, psychological, and military measures."**
  - A viable intelligence organization is critical
  - 'One only has to recognize the importance of waging war in the mind "for the importance of a good psychological operations organization to become apparent." And once this becomes apparent, the importance of intelligence is elevated.'
  - Two kinds of intelligence are key: political and operational
- **Peacekeeping and counterinsurgency: "share surprising similarity in the outward forms of many of the techniques involved."**
  - **Both require the combination and efficient integration of military and non-military resources**

*Guerrillas, Terrorists, and Intelligence Analysis**
Lieutenant Colonel Lester Grau, U.S. Army (Ret)

- **"The military intelligence effort devoted to combating … insurgency has little in common with conventional intelligence operations in support of conventional maneuver war."**
- **"Intelligence preparation of the battlefield, order of battle, templating forces, signals intelligence; measurement and signature intelligence and electronic intelligence take different forms or are not applicable"**
- **"The S2 and G2 are involved in a form of police investigative work, specifically police investigations dealing with gangs and narco-trafficers. Association matrixes, network analysis, cultural analysis, genealogy, event-pattern analysis, language-pattern analysis, traffic flow analysis, and financial transaction analysis are police tools that should be staples of intelligence effort in a counterinsurgency."**
- **"…Intelligence personnel are tracking gangs, not constituted forces. The problem is equivalent to police determining who are in which gangs, what territories they control, and what armaments, tactics, logistics and patterns they use.**

***Military Review, Summer 2004**

Guerrillas, Terrorists, and Intelligence Analysis

- **"Police and Drug Enforcement Administration investigators know how to do this because they have been doing it for years."**
- **Culture counts, and intelligence personnel need to understand the language, history, and culture of they area in which they must work."**
- **"Geographic profiling, a police technique that combines spatial analysis and psychological behavior patters of criminals looks at such factors as distance to the crime, demographics, landscape analysis, pattern analysis, crime scene forensic analysis, and psychological criminal profiling"**
- **"Ambushes, raids, IED and mortar attacks, sniping attacks and other guerrilla actions are complex serial crimes."**

The "Continuum" of Operations

- **IED Detect and Defeat is a subset of:**
- **Force Protection is a subset of:**
- **Counter Insurgency / Counter Terrorism is a subset of:**
- **Pre and post conflict stability operations**

Critical "Kill Chain" Steps

- Intelligence capability enhancements
- Surveillance and reconnaissance
- Tagging, tracking and locating
- Communications and information sharing
- Deterrence, Dissuasion, Information Operations
- Identification, including Indications and Warnings of threats
- Detection of threats; both close in and standoff
- Defeat and consequence management
- Crisis response capabilities
- Multi-level information sharing

Critical Research Needs & Potential Research Areas (Intelligence Capability Enhancements)

- **To support force protection, counter terror/counter insurgency and urban operations**
  - Data management and retrieval capabilities
  - Data fusion enhancements
  - Language translation enhancements
  - Predictive behavioral analysis and enemy pattern assessment capabilities
  - Integration of cultural and anthropological factors into intelligence analysis and decision making
  - Human intelligence collection capabilities
  - Anticipatory understanding of who will act contrary to stabilization efforts
    - Tactical and strategic military intelligence
    - Cultural intelligence aspects including
      - Religious, ethnic, social, political, & economic
    - Key player (counter insurgent) intelligence
  - Indications and Warnings (I&W)

Critical Research Needs and Potential Research Areas (Surveillance and Reconnaissance)

- **To support force protection, counter terror/counter insurgency and urban operations**
  - Capabilities to configure, in near-real-time, architectures to facilitate persistent surveillance, based on available assets and operations needs, in counter terrorism and counter insurgency operations
    - Urban surveillance architectures
    - Wide area surveillance tools
    - Maritime surveillance architectural tools
  - Sensor and sensor platform development to support and populate the above architectures
    - Urban sensors including unattended ground and unmanned aerial sensors
    - Maritime surveillance technologies to identify, track ships, cargo and personnel
    - Tagging, tracking and locating of personnel
  - Facility/perimeter surveillance capabilities
    - Detection of both overt and covert attacks
    - Critical infrastructure protection – railroads, power lines, industrial facilities, etc.
    - Technologies to reduce both surveillance and force protection manpower requirements

Critical Research Needs and Potential Research Areas (Surveillance and Reconnaissance)

- **Change detection, motion detection, backtracking capabilities**
- **Persistent surveillance and reconnaissance**
  - Integrated with intelligence, data mining and information capabilities
  - Persistent wide area surveillance to detect anomalous versus anticipated behavior
- **Capability to track people; not vehicles**
- **Cost, Manufacturing and Security criteria**
  - Cost reduction strategies and technologies
  - Manufacturing enhancements to rapidly produce required capabilities
  - Technology criteria to ensure that compromise of sensors does not compromise technological capabilities
- **Articulation of surveillance and reconnaissance capabilities of both a "classic" battlefield and counter-insurgency environment**

Critical Research Needs and Potential Research Areas (Tagging, Tracking & Locating)

- **Tracking/Locating of:**
  - Persons
  - Vehicles
  - Cargoes or components (ammunition and bomb components)
- **Global identification of individuals**
- **Biometrics for positive identification of bomb makers**
- **Biometrics data management tools**
- **Tagging capabilities:**
  - Overt tagging
  - Covert tagging of vehicles, cargoes and individuals
- **Tagging, marking and neutralization of explosive components**
- **Automatic language recognizers**
- **Counter cover, concealment and deception capabilities**

Critical Research Needs and Potential Research Areas (Communications and Info Sharing)

- **To support force protection, counter terror/counter insurgency and first responder operations**
  - Mobile communications capabilities to support
    - Urban operations
    - Remote operations
    - Counter terror/counter insurgency operations
  - Enhancement of interoperability between national forces
- **Information sharing tools and standards for information exchange between:**
  - US and Coalition Forces
  - Non-military organizations including
    - Other governments
    - Non-governmental organizations
  - Other Federal, state and local governments
    - Law Enforcement organizations
    - Other First responders
- **Theater wide “last mile” communications**
- **Automatic language translators**

Critical Research Needs and Potential Research Areas (Deterrence, Dissuasion, Information Operations)

- **Prevent or deter terrorist or insurgent force attacks**
  - Information operations capability enhancements to deter or influence insurgent activities
  - Psychological operations capability development
  - Tools for identification, analysis and protection of critical infrastructure assets
- **Non-Lethal Capabilities including:**
  - Modeling of crowd or individual responses and behaviors
  - Non lethal capabilities to deter either individuals or crowds

Critical Research Needs and Potential Research Areas (Identification)

- **Differentiation of combatants from non-combatants**
- **Threat identification and classification**
- **Development of I&W capability**
  - For terrorist intentions and activity
  - To detect chemical, biological, radiological and nuclear activity

Critical Research Needs and Potential Research Areas (Detection)

- **Identify attack indicators to detect terrorist or insurgent attacks**
  - Continued WMD and toxic industrial chemical sensor development
  - Portal/entry WMD and explosive detection technologies
  - Toxic industrial chemical/hazardous material tracking and inventory capabilities
  - Wide area surveillance to detect WMD or toxic industrial chemical incidents or attacks
  - Urban wide area surveillance to accomplish the above
  - Change detection capabilities. Detect activity changes within an area to indicate terrorist or insurgent activities
    - Development and integration of Synthetic Aperture Radar, Ground Penetrating Radar, LADAR and electro-optic/infrared systems to support change detection operations in both urban and rural environments
  - Stand off explosive detection, characterization and mitigation capabilities

Critical Research Needs & Potential Research Areas (Defeat)

- **Defeat attacks or minimize**
  - Consequence management tools for WMD/toxic industrial chemical attacks including
    - Detection sensors
    - Modeling and assessment tools to support analysis of WMD dispersion
    - Structural improvements and blast mitigation techniques to protect both personnel and buildings against improvised explosive devices, vehicle borne IEDs and WMD attacks
    - First responder command and control and analysis tools
      - With US military and coalition partners
      - For domestic scenarios with Federal, state and local organizations and first responders
    - Attack remediation and clean up capabilities

Critical Research Needs & Potential Research Areas (Crisis Response Capabilities)

- **Crisis Modeling Assessment and Response Tools**
  - Psychological, Analytical and Support Capabilities
  - Command & Control and Coordination Capabilities
  - Coordination Assessment Capabilities
- **Covert Surveillance and Monitoring Capabilities for:**
  - Situational Assessment
  - Personnel Location Capabilities
- **Recovery Capabilities**
  - Lethal, Non-Lethal and Incapacitation
  - Medical and Psychological Response
- **Media Operational Capabilities**

Critical Research Needs & Potential Research Areas (Multi-Level Information Sharing)

- **Multi-level information sharing tools for coordination on:**
  - Counter terror intelligence
  - WMD threats including both deterrence, detection and consequence management
  - Development and evaluation of supporting policies for information sharing and coordination between military, other Federal departments, state and local agencies
- **Open architecture standards, protocols and supporting procedures to enhance information sharing and coordination**
- **Procedures for sharing of both information and technologies to support homeland security operations**